C L A I M S

1. A method of manufacturing a carcass structure for motor-vehicle tyres, characterized in that it comprises the steps of:

- preparing strip-like sections (13, 14, 15, 16) each comprising longitudinal and parallel thread-like elements (17) coated at least partly with at least one layer of raw elastomer material (20);
- laying down a first series of said strip-like sections (13) onto a toroidal support (11), each of them extending in a substantially U-shaped configuration around the cross-section outline of the toroidal support itself and circumferentially distributed according to a circumferential pitch corresponding to a multiple of the width of the strip-like sections (13, 14, 15, 16);
- applying first primary portions (4a) of annular reinforcing structures (4) against end flaps of said strip-like sections (13) belonging to the first series, at axially opposite positions relative to an equatorial plane of the support drum (11);
- laying down on the toroidal support (11), at least one second series of said strip-like sections (14) each extending according to a U-shaped conformation around the cross-section outline of the toroidal support (11), between two consecutive sections (13) of the first series, in order to define a first carcass ply (3a) together with said last-mentioned sections, each of the sections (14) of the second series having end flaps overlapping the respective primary portions (4a) of the annular reinforcing structures (4) at an axially opposite position relative to the end flaps of the sections of the first series (13);
- laying down on the toroidal support (11), a third series of said strip-like sections (15), each extending according to a substantially U-shaped conformation around

the cross-section outline of the toroidal support itself and circumferentially distributed according to a circumferential pitch corresponding to a multiple of the width of the strip-like sections (13, 14, 15, 16);

- applying second primary portions (4b) of said annular reinforcing structures (4) against the end flaps of said strip-like sections (15) belonging to the third series, at axially opposite positions relative to the first primary portions (4a);

- laying down on the toroidal support (11), at least one fourth series of said strip-like sections (16), each extending according to a U-shaped conformation around the cross-section outline of the toroidal support (11), between two consecutive sections (15) of the third series, in order to define, together with said last-mentioned sections, a second carcass ply (3b) overlapping the first carcass-ply (3a), each of the sections (16) of the fourth series having end flaps overlapping the respective second primary portions (4b) of the annular reinforcing structures (4) at an axially opposite position relative to the end flaps of the sections of the third series (15).

2. A method as claimed in claim 1, wherein the strip-like sections (13, 14, 15, 16) making up the first and second carcass plies (3a, 3b) respectively, are laid down in a respectively crossed orientation.

3. A method as claimed in claim 2, wherein the strip-like sections (13, 14, 15, 16) belonging to the first and second carcass plies (3a, 3b) respectively are laid down in an orientation inclined at an angle included between 15° and 35° relative to a circumferential-extension direction of the toroidal support (11).

4. A method as claimed in claim 1, further comprising the

step of applying additional portions (26) of the annular reinforcing structures (4) against the end flaps of the strip-like sections (16) belonging to the fourth series, so that each of said end flaps is enclosed between the second primary portion (4b) and the additional portion (26) of the respective annular reinforcing structure (4).

5. A method as claimed in claim 1, wherein each of said strip-like sections (13, 14, 15, 16) is laid down so as to form two side portions (13a, 14a, 15a, 16a) substantially extending in the direction of the geometric rotation axis of the toroidal support (11) at mutually spaced apart positions in an axial direction, and a crown portion (13b, 14b, 15b, 16b) extending at a radially outer position between the side portions (13a, 14a, 15a, 16a), the crown portions (13b, 14b, 15b, 16b) of the strip-like sections (13, 14, 15, 16) belonging to the first and second carcass plies (3a, 3b) respectively being disposed consecutively in side by side relationship along the circumferential extension of the toroidal support (11).

6. A method as claimed in claim 5, wherein the side portions (13a, 15a) of each strip-like section (13, 15) belonging to the first series and the third series respectively are each partly covered with a side portion (14a, 16a) of at least one circumferentially consecutive section (14, 16) belonging to the second series and the fourth series respectively, at a stretch included between a radially outer edge of the respective primary portion (4a, 4b) of the annular reinforcing structure (4) and a transition region between said side portions (13a, 14a, 15a, 16a) and said crown portions (13b, 14b, 15b, 16b).

7. A method as claimed in claim 1, wherein the side portions (13a, 14a, 15a, 16a) of said strip-like

sections (13, 14, 15, 16) are made radially converge towards the geometric rotation axis of the toroidal support (11).

8. A method of manufacturing a carcass structure for motor-vehicle tyres, in particular as claimed in claim 1, wherein accomplishment of at least one of said first and second primary portions (4a, 4b) of each annular reinforcing structure (4) comprises the steps of:

- laying down at least one elongated element in concentric coils (23a, 24a) to form a circumferentially inextensible annular insert (21, 24) substantially in the form of a crown;
- forming at least one filling body (22, 25) of elastomer material;
- joining the filling body (22, 25) to the first circumferentially inextensible annular insert (21, 24).

9. A method as claimed in claim 8, wherein said elongated element is deposited directly against the end flaps of the strip-like sections (13, 14, 15) previously deposited on the toroidal support (11), to form said first annular insert (21, 24) directly in contact with the strip-like sections themselves.

10. A method as claimed in claim 8, wherein said filling body (22, 25) is formed by depositing a continuous strip of elastomer material directly against the annular insert (21, 24) previously applied to the end flaps of the strip-like sections (13, 14, 15) previously laid-down.

11. A method as claimed in claim 8, wherein said elongated element is laid down in a forming seat defined in a moulding cavity (23) in which the filling body (22, 25) is subsequently formed, so that joining of said filling body (22, 25) to the annular insert (21, 24) is

carried out concurrently with formation of the filling body itself.

12. A method as claimed in claim 8, wherein said joining step is carried out by applying the filling body (22, 25) against said annular insert (21, 24) previously applied to the end flaps of the strip-like sections (13, 14, 15) laid down on the toroidal support (11).

13. A method as claimed in claim 4, wherein formation of said additional portion (26) of each annular reinforcing structure (4) comprises the step of depositing at least one elongated element in concentric coils (26a) to form an additional circumferentially inextensible annular insert substantially in the form of a crown.

14. A method as claimed in claim 13, wherein said elongated element is laid down directly against the carcass structure (2) during the toroidal support (11) formation step.

15. A carcass structure for vehicle wheel tyres, comprising:
- at least one first and one second carcass plies (3a, 3b) each formed of strip-like sections (13, 14, 15, 16) each of which extends in a substantially U-shaped conformation and comprises at least two thread-like elements (17) longitudinally arranged parallelly of each other and at least partly coated with at least one layer of raw elastomer material (20); and
- a pair of annular reinforcing structures (4) engaged close to respective inner circumferential edges of the carcass plies (3a, 3b).
characterized in that:
- said first carcass ply (3a) comprises a first and a second series of strip-like sections (13, 14) arranged in

a mutually alternating sequence along the circumferential extension of the carcass structure (2),

- said second carcass ply (3b) comprises a third and a fourth series of strip-like sections (15, 16) arranged in a mutually alternating sequence along the circumferential extension of the carcass structure (2),

each of said annular reinforcing structures (4) comprising at least:

- one first primary portion (4a) having an axially inner side turned towards end flaps of the sections belonging to the first series (13) and an axially outer side turned towards end flaps of the sections belonging to the second series (14), and

- one second primary portion (4b) having an axially inner side turned towards end flaps of the sections belonging to the third series (15) and an axially outer side turned towards end flaps of the sections belonging to the fourth series (16).

16. A carcass structure as claimed in claim 15, wherein the sections of the first and second series (13, 14) extend in a crossed orientation with respect to the strip-like sections of the third and fourth series (15, 16).

17. A carcass structure as claimed in claim 16, wherein each of said strip-like sections (13, 14, 15, 16) has an orientation inclined at an angle included between 15° and 35° relative to a circumferential-extension direction.

18. A carcass structure as claimed in claim 15, wherein each of said annular reinforcing structures (4) further comprises at least one additional portion (26) disposed against the end flaps of the strip-like sections belonging to the fourth series (16), on the opposite side relative to the second primary portion (4b) of the

annular structure itself.

19. A carcass structure as claimed in claim 15, wherein each of said strip-like sections (13, 14, 15, 16) has two side portions (13a, 14a, 15a, 16a) substantially extending towards a geometric axis of said carcass structure (2) at mutually spaced apart positions in an axial direction, and a crown portion (13b, 14b, 15b, 16b) extending at a radially outer position between the side portions (13a, 14a, 15a, 16a),
the crown portions (13b, 14b, 15b, 16a) belonging to the sections of the first and second series (13, 14) respectively, and of the third and fourth series (15, 16) respectively, being arranged in mutual side by side relationship along the circumferential extension of the carcass structure (2).

20. A carcass structure as claimed in claim 19, wherein the side portions (13a, 15a) of each strip-like section belonging to the first and the third series respectively are each partly covered with a side portion (14a, 16a) of at least one adjacent strip-like section (14, 16) belonging to the second and fourth series respectively, at a stretch included between a radially outer edge of the respective primary portion (4a, 4b) of the annular reinforcing structure (4) and a transition region between said side portions (13a, 14a, 15a, 16a) and said crown portions (13b, 14b, 15b, 16b).

21. A carcass structure as claimed in claim 15, wherein the side portions (13a, 14a, 15a, 16a) of said strip-like sections (13, 14, 15, 16) radially converge towards a geometric rotation axis of the carcass structure (2).

22. A carcass structure as claimed in claim 15, wherein the individual strip-like sections (13, 14, 15, 16)

belonging to one of said series respectively, are disposed according to a circumferential distribution pitch corresponding to a multiple of the width of the strip-like sections themselves.

23. A carcass structure as claimed in claim 15, wherein each of said strip-like sections (13, 14, 15, 16) has a width included between 3 and 15 mm.

24. A carcass structure as claimed in claim 15, wherein each of said strip-like sections (13, 14, 15, 16) comprises three to eight thread-like elements (17).

25. A carcass structure as claimed in claim 15, wherein said thread-like elements (17) are disposed in the respective strip-like sections (13, 14, 15, 16) according to a mutual distance between centres not lower than 1.5 times the diameter of the thread-like elements themselves.

26. A carcass structure for vehicle wheel tyres, in particular as claimed in claim 15, wherein each of said first and second primary portions (4a, 4b) of each of said inextensible annular structures (4) comprises:

- a circumferentially inextensible annular insert (21, 24) substantially in the form of a crown disposed coaxially with the carcass structure (2) and close to an inner circumferential edge of the carcass plies (3a, 3b), said annular insert (21, 24) being made up of at least one elongated element extending in concentric coils (21a, 24a);
- a filling body (22, 25) of elastomer material having one side joined to the annular anchoring insert (21, 24).

27. A carcass structure as claimed in claim 26, wherein each of said annular reinforcing structures (4) further

comprises at least one additional portion (26) disposed against the end flaps of the strip-like sections (16) belonging to the fourth series, on the opposite side relative to the second primary portion (4b) of the annular structure itself.

28. A carcass structure as claimed in claim 27, wherein said additional portion comprises an additional circumferentially-inextensible annular insert (26) substantially in the form of a crown, made up of at least one elongated element extending in concentric coils (26a) and disposed coaxially with the carcass structure (2) at a position axially close to the filling body of the second primary portion of the respective inextensible annular structure.

29. A carcass structure as claimed in claim 26, wherein the filling body (22, 25) of elastomer material of each of said primary portions (4a, 4b) has a hardness included between 48° and 55° Shore D at 23°C.